CWTe 2022

NXP B5G/6G VISION
“ COMMUNICATIONS AND MOBILITY “

Marcel Geurts

Principal System Architect - BL Radio Power

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SECURE CONNECTIONS
FOR A SMARTER WORLD

HISTORY OF NXP
A WORLD OF OPPORTUNITY

Societal and digital transformation goals as drivers for 6G
“6G Beyond another G”

Today – Traditional networks

Use cases are driven by the network capabilities

Performance | Size | Cost | Power

1G → 5G

1G TO 5G

Metrics driven

Future – Purposeful networks

Networks are driven by the use cases

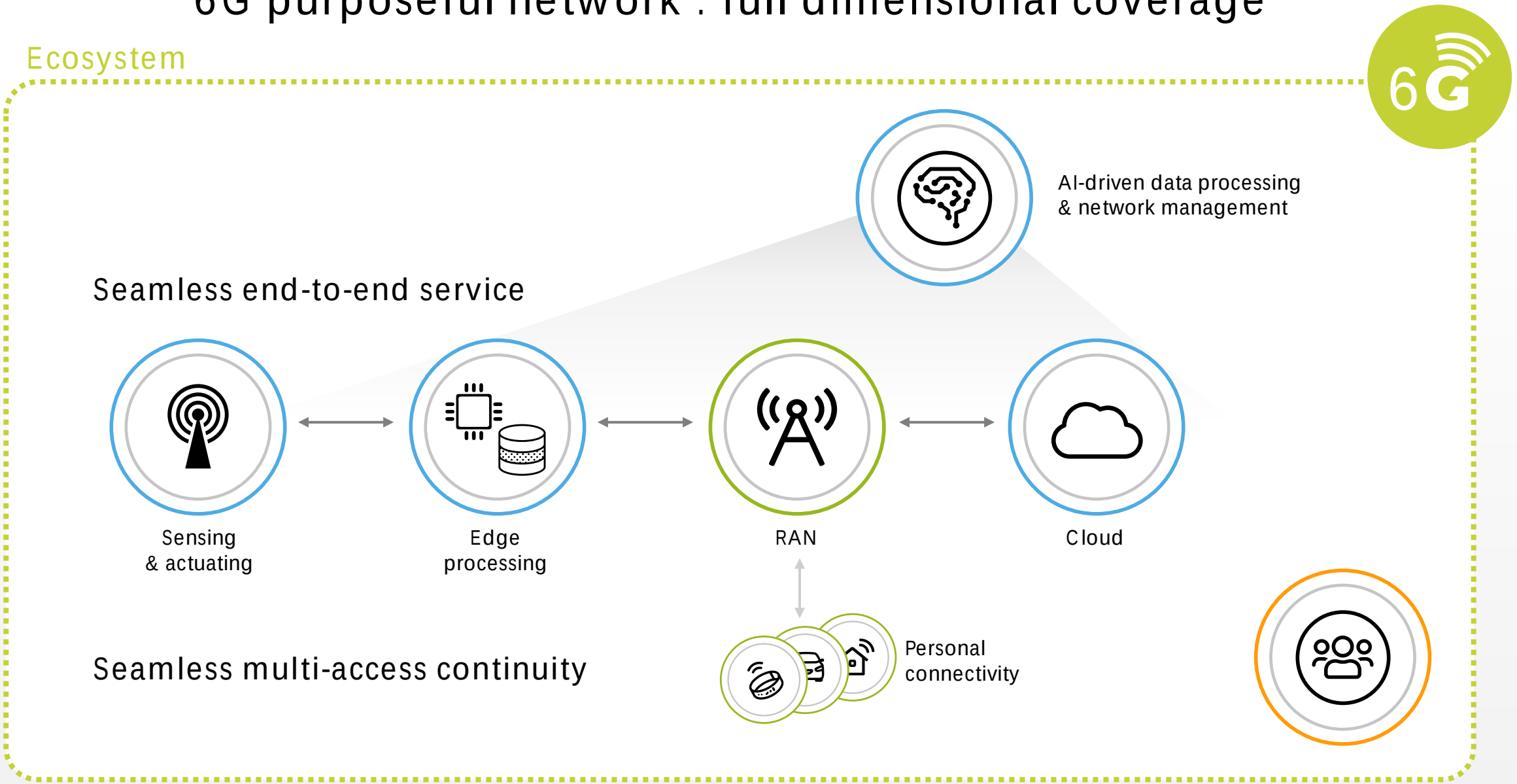
PURPOSEFUL

Global digital society: reducing inequalities, universal digital inclusion, safety and privacy, end-to-end environmental impact and energy efficiency

Source: 6G Drivers and Vision White Paper, NGMN, April 2021
*6G Beyond another G“ by NXP at 2021 6G Symposium Europe, hosted by 6GWorld

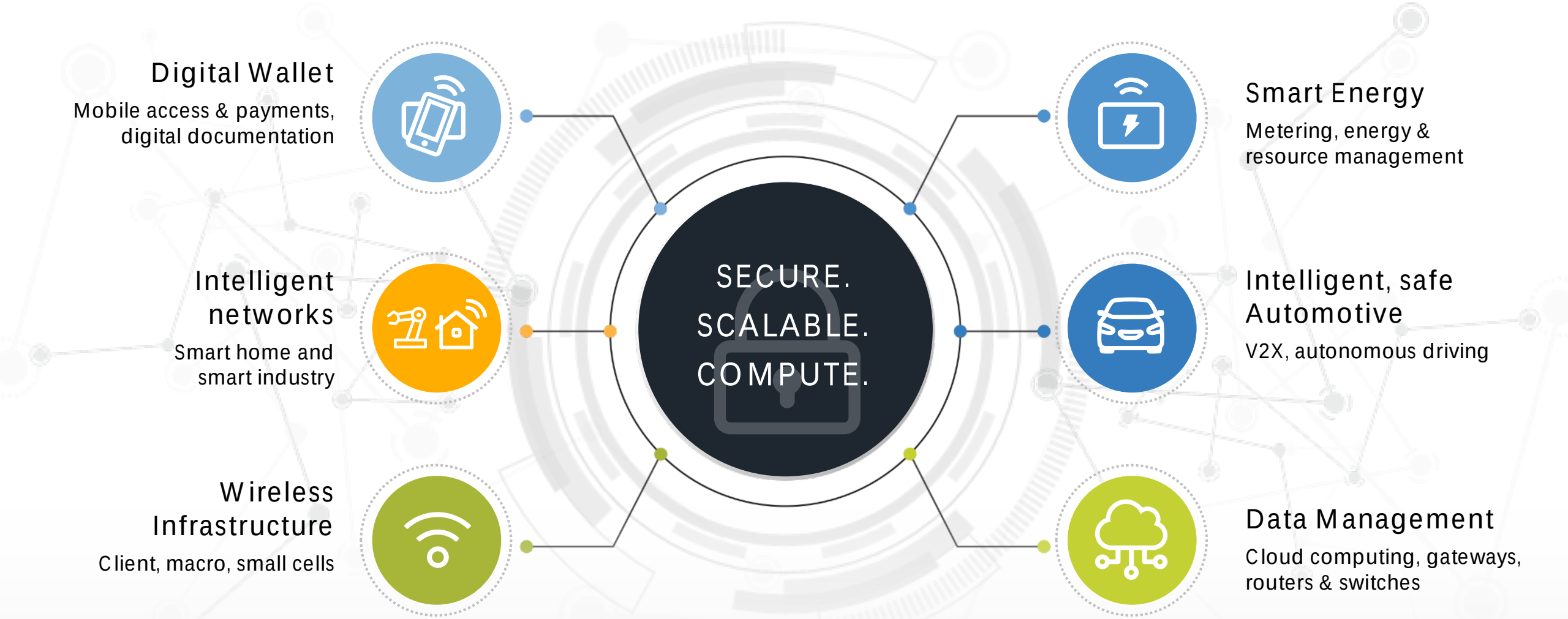
6G purposeful network : full dimensional coverage

Ecosystem



Purposeful scalable secure and safe networks –what do we have today?

TRUSTWORTHINESS



Digital Wallet

Mobile access & payments, digital documentation

Intelligent networks

Smart home and smart industry

Wireless Infrastructure

Client, macro, small cells

Smart Energy

Metering, energy & resource management

Intelligent, safe Automotive

V2X, autonomous driving

Data Management

Cloud computing, gateways, routers & switches

Seamless multi-access continuity – what is available today?

UWB

miGLO

zigbee

MIFARE

sigfox

RAIN RFID

THREAD

Wi Fi

Bluetooth

V2X

5G

SMART CITY

ROBOTICS

INDUSTRIAL CONTROLLER

SMART HEALTH

AUTO GATEWAY

SMART BUILDINGS

SMART HOME

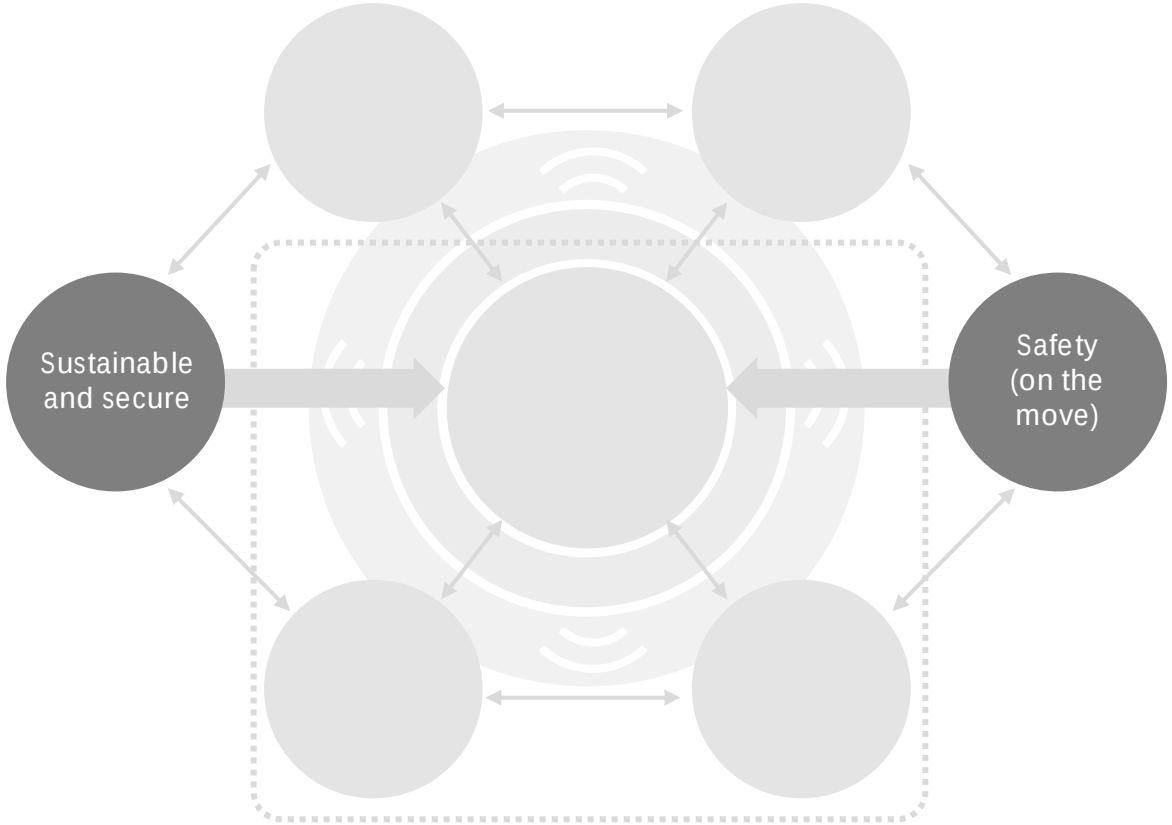
SMART RETAIL

HOME GATEWAY

MEDIA STREAMING

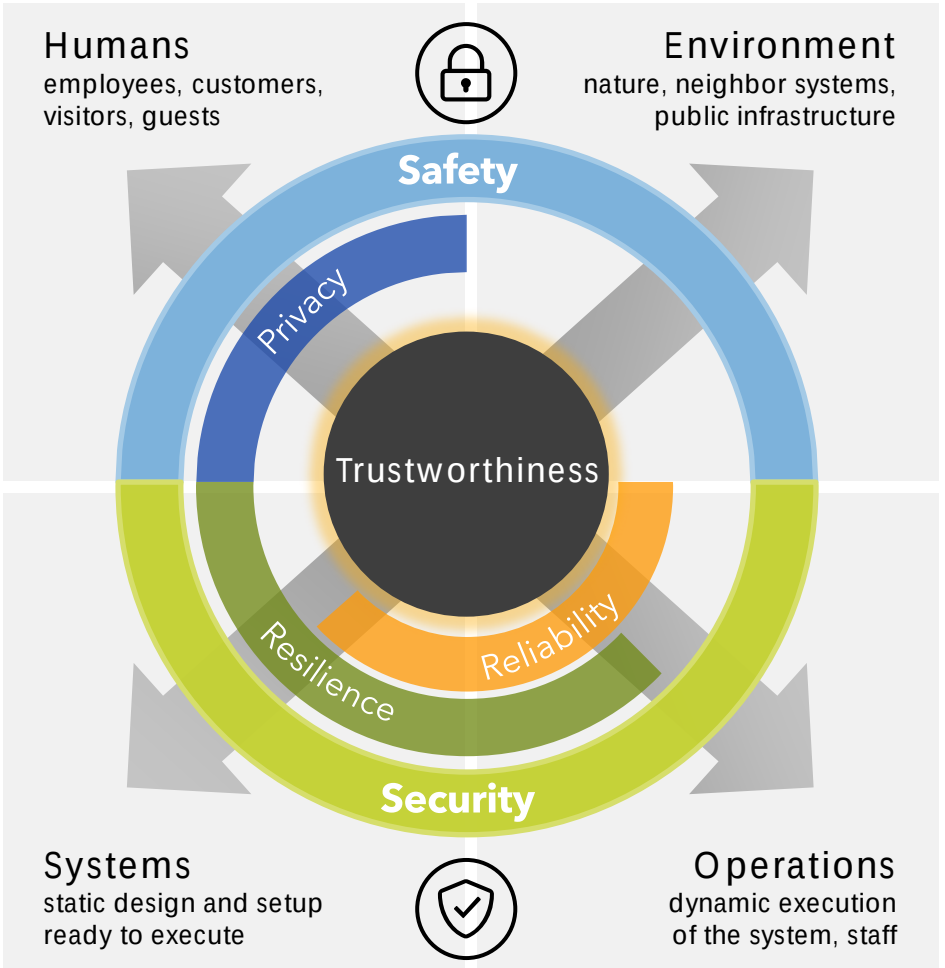
WEARABLES

The ambition : 6G can enhance safety for mobility applications



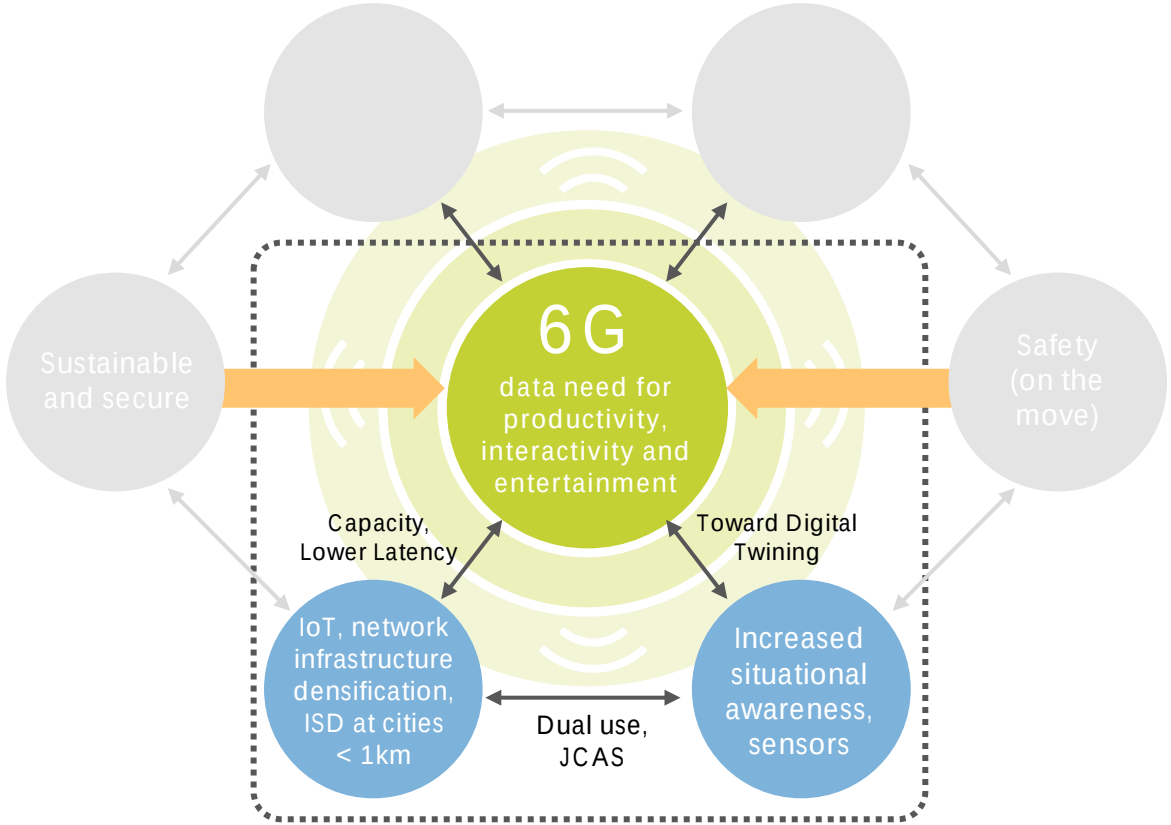
JCAS = Joint Communication and Sensing

Trustworthiness target model



Courtesy: The Industrial Internet of Things Trustworthiness Framework Foundations. Version V1.00 -2021-07-15

The ambition: 6G can enhance safety for mobility applications



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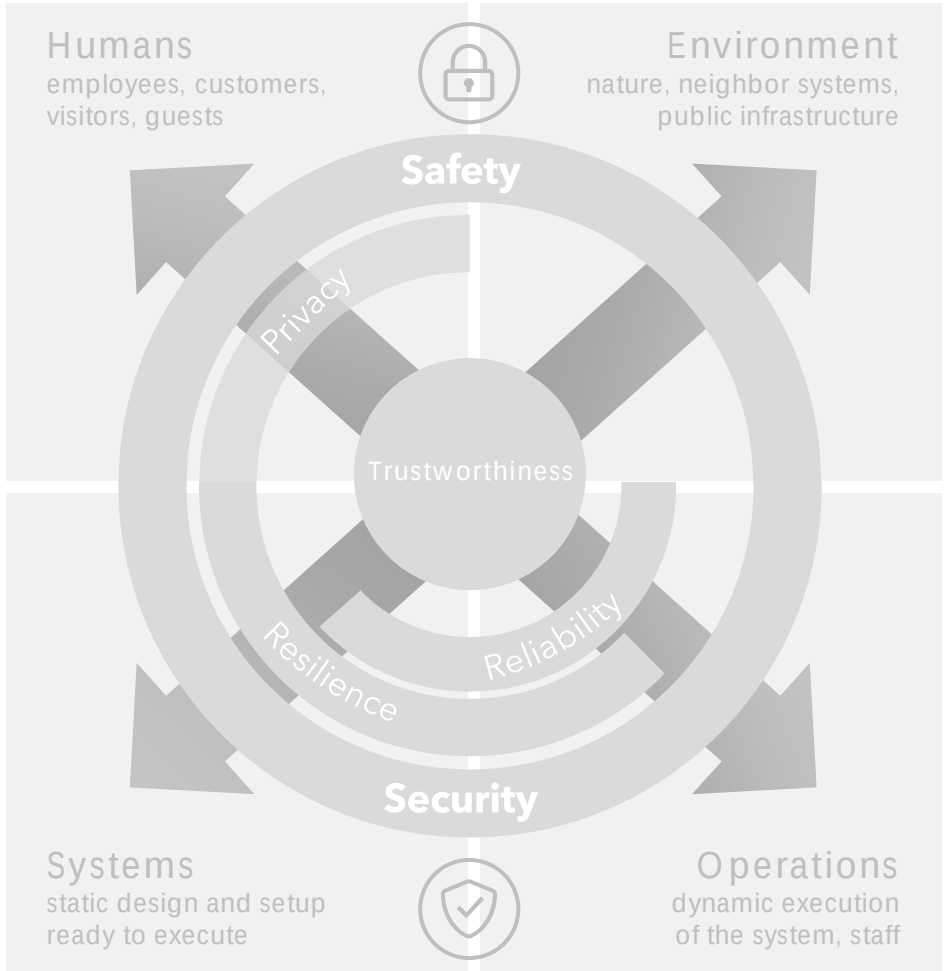

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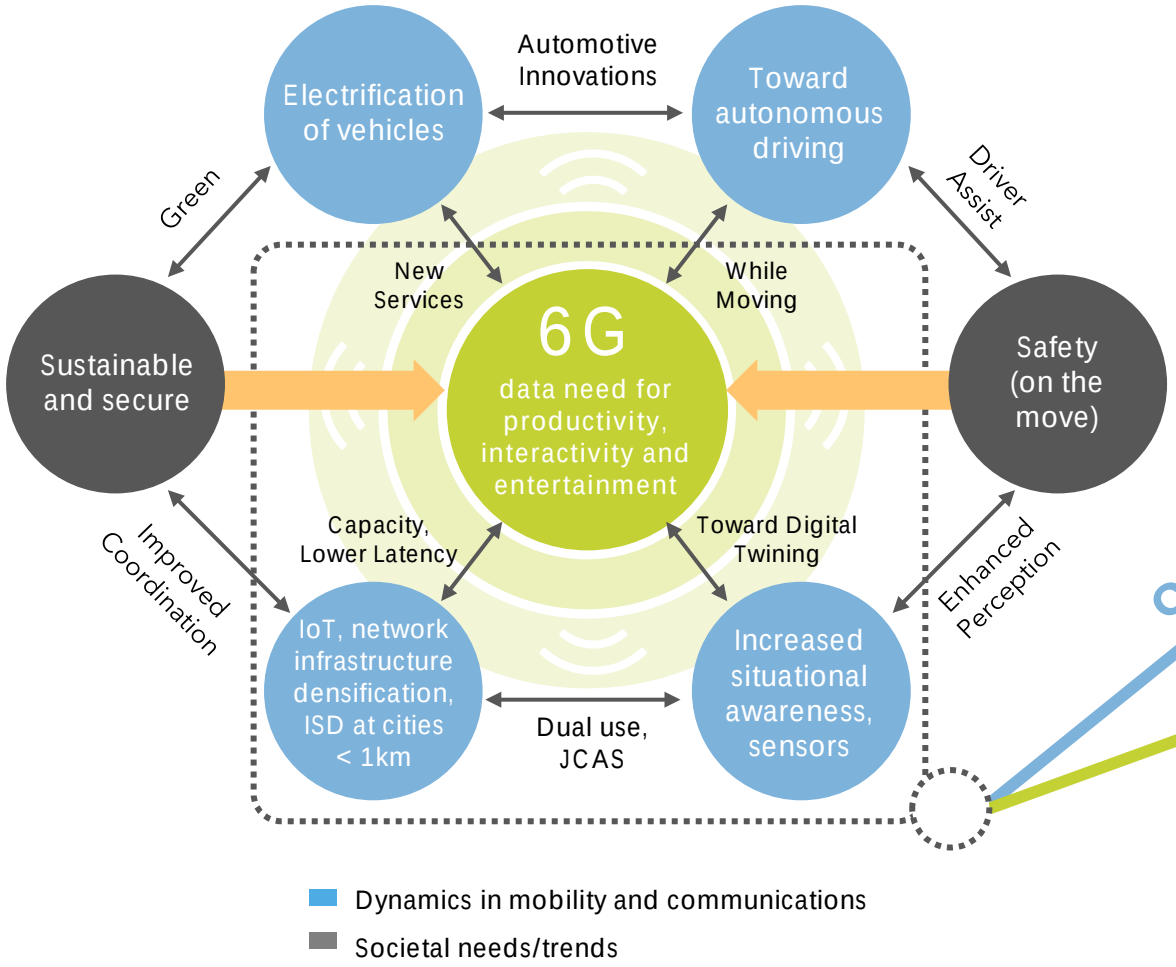

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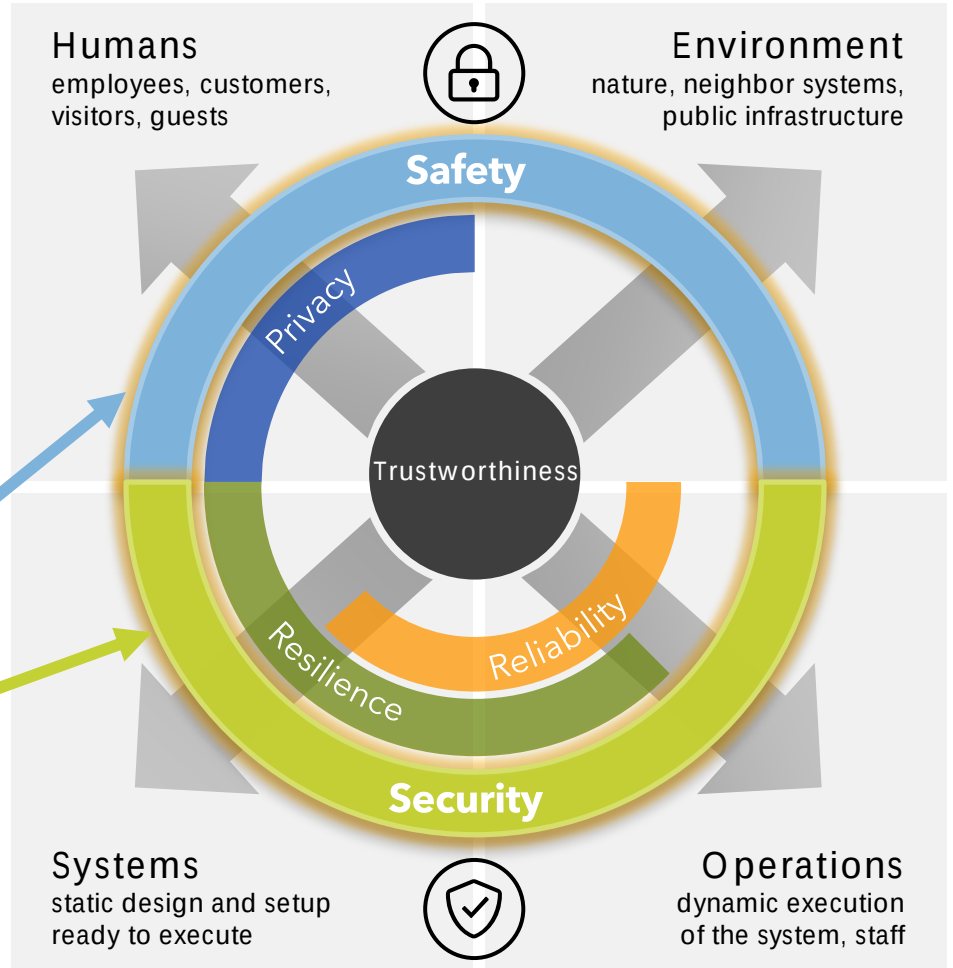

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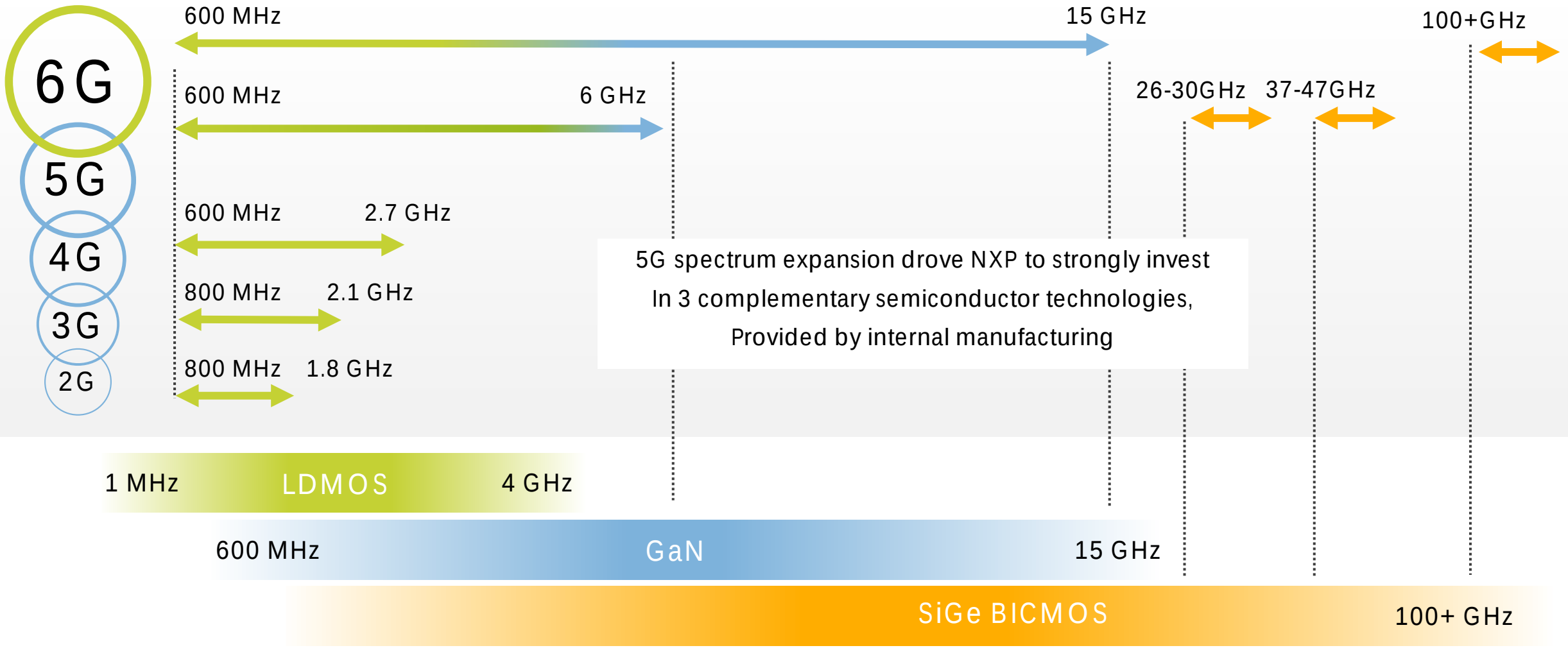
6G Radio needs

Frequency versus technology for Basestation infra

Expecting higher bandwidth availability especially at Terahertz frequencies



6G dual use architecture

mmW-THz sensing is not a costly mode of operation

Value

Environment Sense/awareness can support radio network performance

Sense/awareness for safety (and complementary to vision/camera observation)

Complexity/Cost

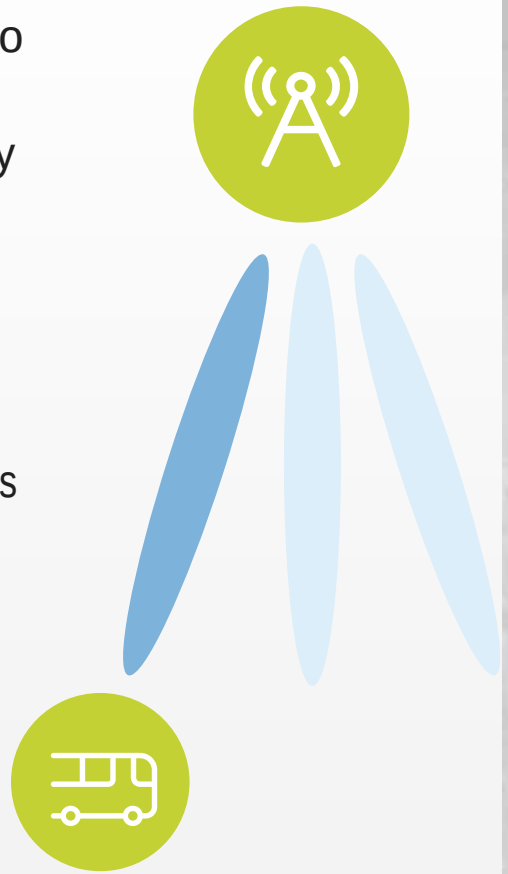
Similar beamforming and scanning principles

Hardware: comms mostly superset requirements

System challenges

- Timing co-ordination/synchronization
- Comms/Sense Resource allocation and mutual interferences

Site – communication and sensing have similar needs



Purposeful networking: The automotive safety –security case

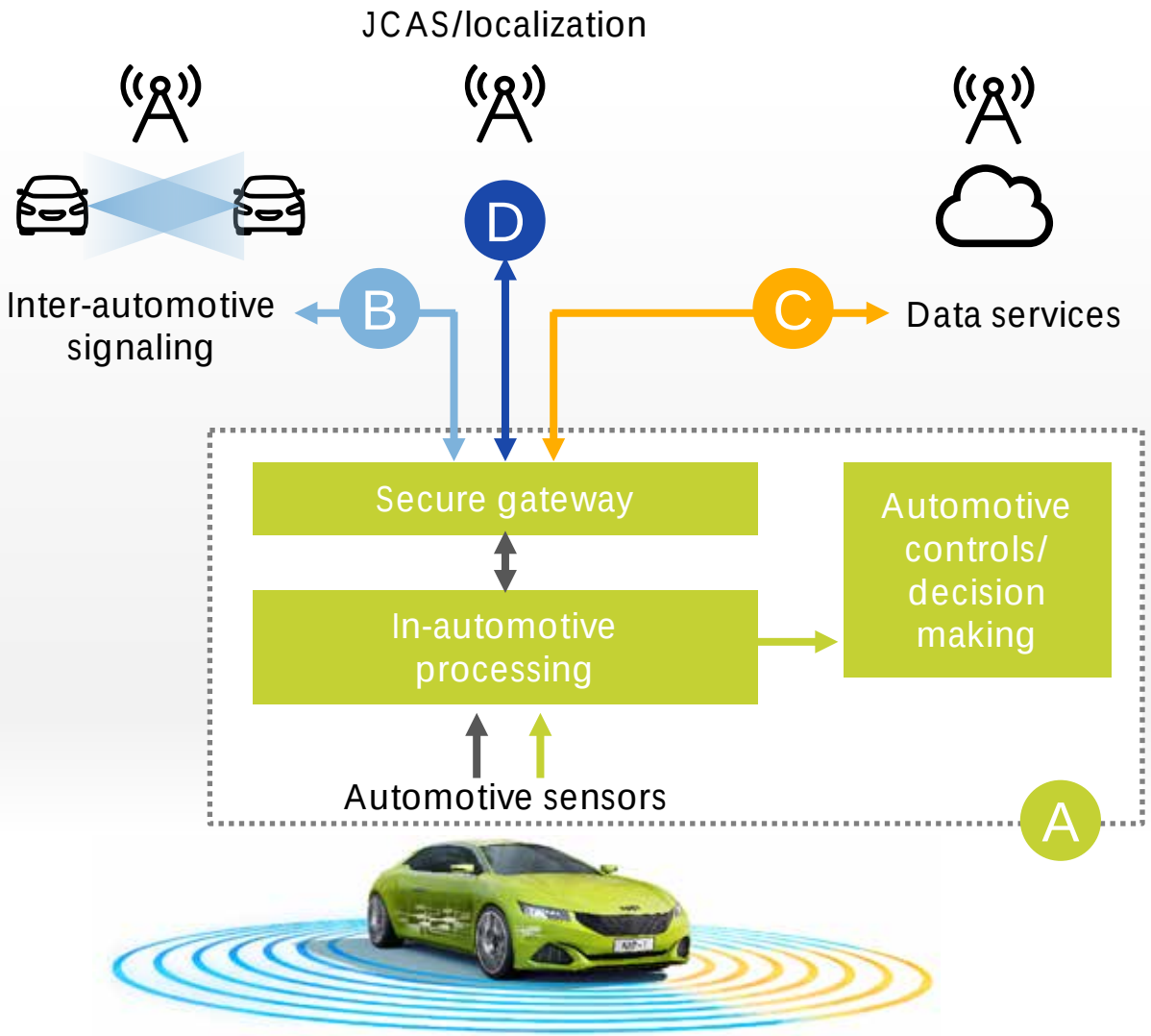
Automotive domain use cases

Safety & in-car experiences

- Environment perception for car safety
- Infotainment on-the-drive
- Smart Access

Data driven services

- HD mapping
- Remote automotive services
- Machine learning augmented sensing
- Mobile environmental monitoring



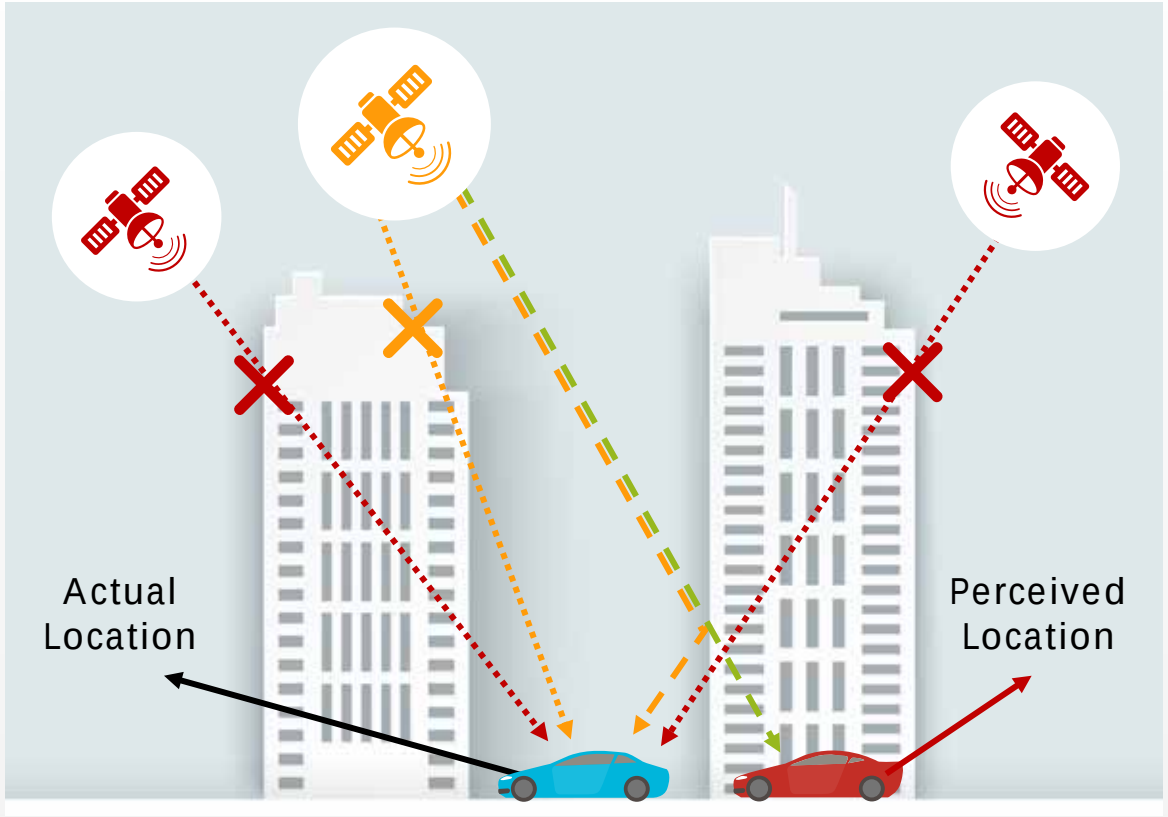
6G technologies

1. New spectrum Sub 20GHz and Terahertz
2. JCAS for passive user sensing
3. Improved localization for connected users/car

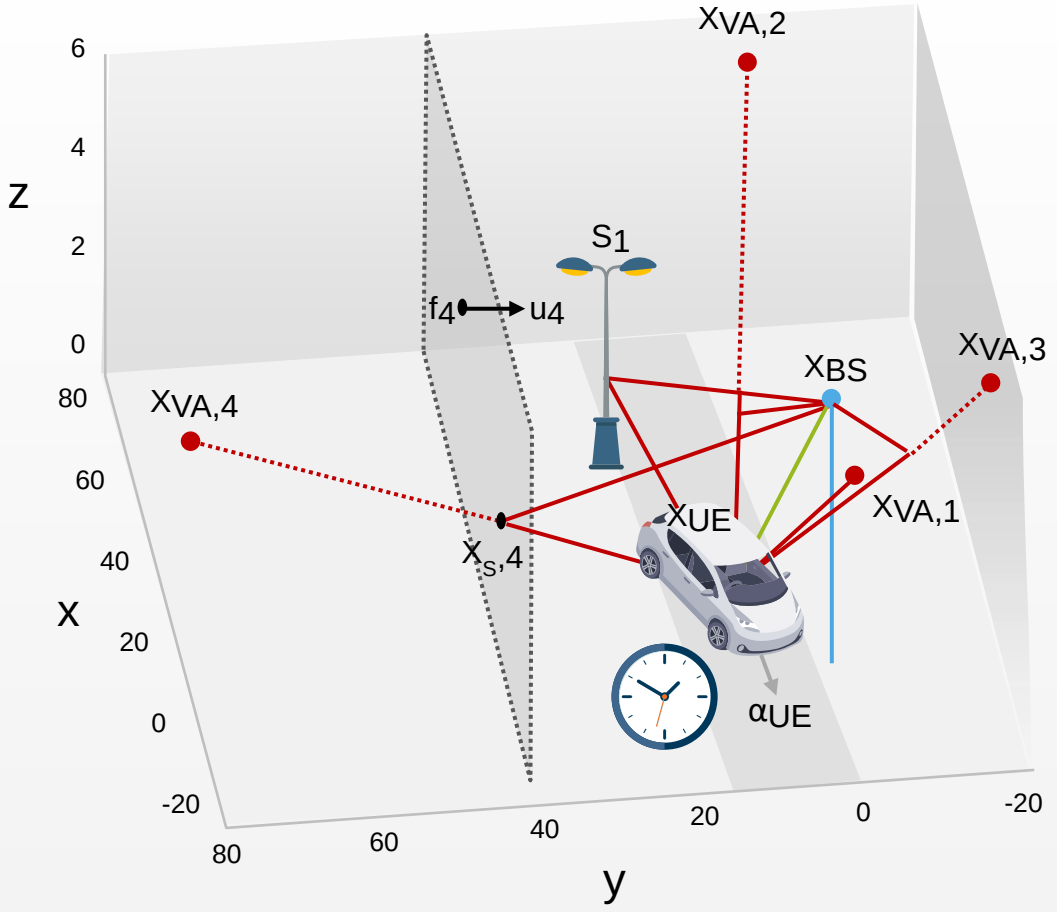
The future of automotive connectivity, white paper NXP / ABI research

5G and 6G opportunities to enhance network localization

Enhanced GPS system based localization



Enhanced localization accuracy from UE-BS link



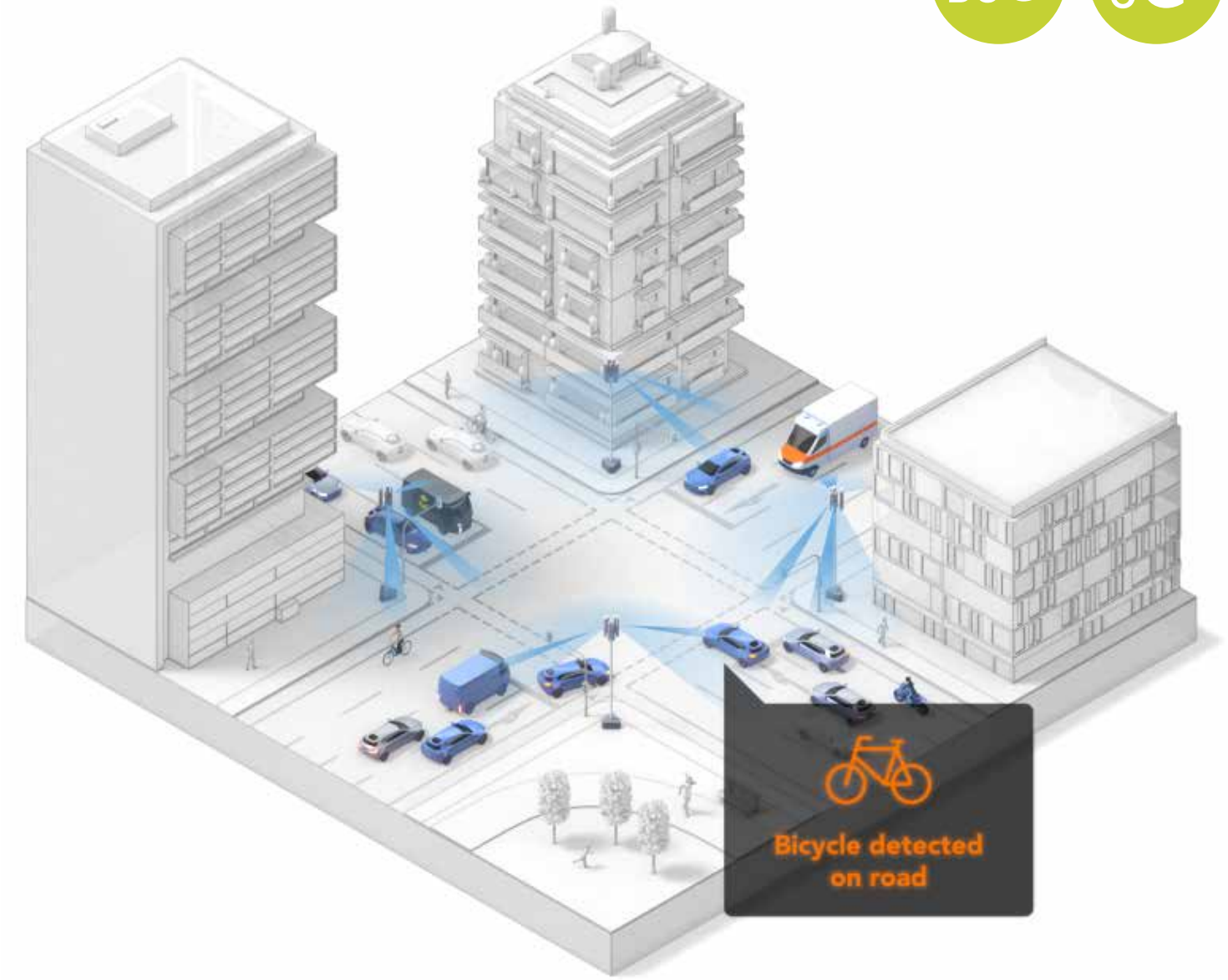
Courtesy: Wymeersch - joint Communication and sensing

B5G/6G opportunities for augmenting automotive safety

Enhanced sensing capabilities

Two options

1. Vehicle centric
2. Infrastructure centric



Joint communication and sensing in 6G networks – Ericsson blog, 25-10-2021
Joint communication and sensing in 6G networks – NXP blog, 5-11-2021

B5G/6G COMMUNICATIONS AND MOBILITY

New opportunities to improve automotive safety

Network densification comes with options for environment observability

- Further improvement of network localization techniques
- High bandwidth mmwave/THz frequencies beneficial for sensing capabilities

High-rate connectivity enables data and ML driven applications for the car

NXP is well positioned to deliver this vision
along with other key players in the connected automotive eco-system

Key radio technology available
to support new frequency challenges

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